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Al-Ir-Ni (Aluminum-Iridium-Nickel)

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Recently, [2007Yam] determined an isothermal section for this system at 1300 °C in the composition range up to 50 at.% Al.

Binary Systems

The Al-Ir phase diagram [Massalski2] depicts the following intermediate phases: Ir_2Al_9 ($D8_d$, Co_2Al_9-type monoclinic), Ir_4Al_{13} (monoclinic), $IrAl_3$ ($D0_{18}$, Na_3As-type hexagonal), Ir_2Al_5 (or $IrAl_{2.7}$, cubic), and IrAl ($B2$, CsCl-type cubic). The Al-Ni phase diagram [Massalski2] shows five intermediate phases: $NiAl_3$ ($D0_{11}$, Fe_3C-type orthorhombic), Ni_2Al_3 ($D5_{13}$-type hexagonal), NiAl ($B2$, CsCl-type cubic), Ni_5Al_3 (Ga_3Pt_5-type orthorhombic), and Ni_3Al ($L1_2$, $AuCu_3$-type cubic; denoted γ'). Ir and Ni form a continuous face-centered cubic (fcc) solid solution.

Ternary Isothermal Section

[2007Yam] arc-melted under Ar atm 18 ternary alloys (including 4 alloys investigated by [2003Yam]), with Al content up to 50 at.%. The alloys were annealed at 1300 °C. The phase equilibria were studied with x-ray diffraction, scanning and transmission electron microscopy, and electron probe microanalysis. The isothermal section at 1300 °C constructed by [2007Yam] is shown in Fig. 1. NiAl and IrAl form a continuous $B2$ solid solution. The two-phase equilibrium between fcc and $B2$ phases dominates the section. The $L1_2$ (Ni_3Al) phase dissolves up to 3.5 at.% Ir. A narrow three-phase region of ($L1_2$ + fcc + $B2$) is present.

References

2003Yam: Y. Yamabe-Mitarai and H. Aoki, Phase Constitution and Creep Properties of Ir-Ni-Al Alloys, *Mater. Sci. Eng. A*, 2003, **A362**, p 152-159

2007Yam: Y. Yamabe-Mitarai, T. Aoyagi, K. Nishida, H. Aoki, T. Abe, and H. Murakami, Phase Equilibria between the $B2$, $L1_2$, and fcc phases in the Ir-Ni-Al System, *Intermetallics*, 2007, **15**, p 479-488

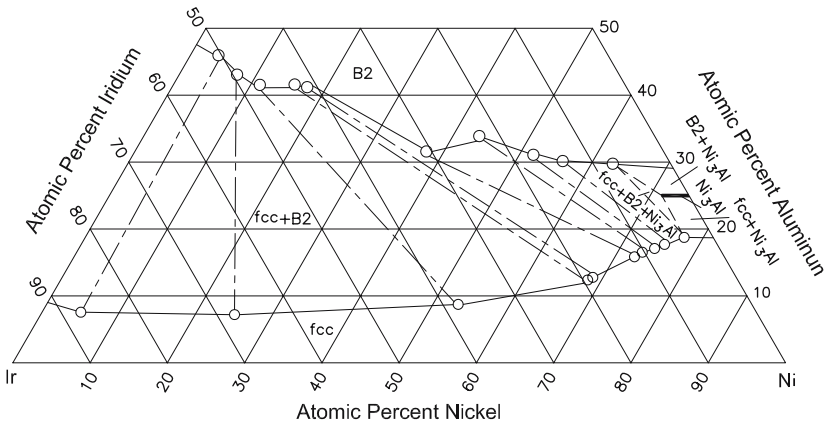

Fig. 1 Al-Ir-Ni isothermal section at 1300 °C [2007Yam]